Department of the Interior
U.S. Geological Survey

README

PROVISIONAL BURNED AREA ESSENTIAL CLIMATE VARIABLE (BAECV) PRODUCT

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Section 1 Product Overview & Access

The Burned Area Essential Climate Variable (BAECV; http://remotesensing.usgs.gov/ecv/BA_overview.php) includes pre-generated datasets for World-Reference System 2 (WRS2) path/rows at 2 temporal resolutions: **per-scene** outputs corresponding to individual Landsat scenes and **annual composites** summarizing the individual scenes for a calendar year.

The annual composites can be obtained through an online interactive map at: http://remotesensing.usgs.gov/ecv/BA_overview.php. The annual composites, along with per-scene outputs, may also be obtained at http://espa.cr.usgs.gov/provisional/burned_area/. These data are delivered as .tar.gz archives containing all the per-scene or annual composites for a single path/row. The per-scene or annual composite archives include GeoTIFF (.tif) files and their associated histogram files (.aux.xml). The BAECV per-scene and annual composites have similar, but slightly different outputs and file naming conventions described in detail below. Characteristics of all the BAECV products are listed in **Table** *2-A*.

To make visualization of the burn probability and burn classification products easier, ArcGIS Layer files (.lyr) are provided on the BAECV website to automatically assign red-green color gradients and labels to each dataset.

Section 2 Product Characteristics

All BAECV products are generated by default at 30-meter spatial resolution on a Universal Transverse Mercator (UTM) mapping grid. Spatial reference information is embedded within the GeoTIFF files. The products span the 1985 to 2013 time frame. Both BAECV products (per-scene and annual composite) are delivered as compressed tar archives (.tar.gz files) for each WRS2 path/row.

2.1 Per-scene BAECV outputs and naming conventions

Per-scene products include burn probabilities and burn classifications. Burn probability (BP) products are continuous data, representing the probability that a pixel was burned by fire, given what is visible in the Landsat scenes. Burn probabilities range between 0 and 1,000 as they were scaled by a factor of 10. A threshold process was applied to the BP data to produce the burn classification (BC) products (see the algorithm technical description). Contiguous burned area patches (identified using a 4-neighbor rule) in the BC data were assigned positive values (patch id), in addition to other attributes quantifying the number of pixels in the seed patch (Area), the number of pixels in the entire patch (FilledArea), and maximum, mean, and minimum burn probability values in the path (MaxIntensity, MeanIntensity, and MinIntensity attributes, respectively). Both the BP and BC BAECV products retain the QA masks – specified by negative values in the data (**Table 2-B** and **Table 2-C**).

Per-scene BAECV output files are named with the original scene ID prepended with the product name prefix (“bp_” or “bc_” for burn probability and classification, respectively). The following are the components of a typical file:

prod_LXXPPPRRRYYYYDDDSTNVR.ext
(e.g., bp_LE71820342003126ASN00.tif)

prod	Product, such as “bp” or “bc”
LXX	LE7 for Landsat 7 ETM+; LT5 for Landsat 5 TM; LT4 for Landsat 4 TM
PPP	Path
RRR	Row
YYYY	Year of Acquisition
DDD	Julian Date of Acquisition
STN	Receiving Station
VR	Version Number
ext	File format extension, such as “tif” or “.aux.xml”

2.2 Annual composite BAECV outputs and naming conventions

Four annual composite BAECV products are provided. The annual composites were generated by summarizing all the individual per-scene outputs across a single calendar year. Annual composite outputs include:

1. The maximum value per pixel for burn probability for a year (bp).
2. The count of per-scene burn classification images where the pixel was classified as burned (bc). Values in these imagers are zero or larger. No burned areas were identified in pixels with values of zero in these images.
3. The Julian date of the first per-scene classification image where the pixel was classified as burned (bd). Values in these images range between 0 and 366.
4. The number of per-scene images with a cloud-free observation for a given pixel (gc). Values in these images are zero or larger.

The following are the components of a typical annual composite image file name:

prod_yyyy.ext
(e.g. bp_2008.tif)

prod	Product, such as maximum burn probability (bp), first Julian date that the burn was observed (bd), the count of per-scene images that classified the pixel as burned (bc), the number of cloud-free pixels (gc).
yyyy	Year of data compilation
ext	File format extension, such as “tif” or “aux.xml

The specifications of each BAECV product output file is described in **Table** *2-A*. Individual bit values for the burn probability product are described in **Table** *2-B*, and for the burn class product in **Table 2-C**.

Table 2-A Burned Area Essential Climate Variable (BAECV) output product specifications

YYYY year, NA not applicable, INT16 16-bit signed integer, sceneid Landsat Scene Identifier

Image Name	Description	Data Type	Units	Range	Valid Range	Fill Value	Saturate Value	Scale Factor
Per-scene outputs								
bc_sceneid	Burned area size (pixels) and land cover conditions	INT16	Flag	-9998-32767	-9998-32767	-9999	NA	NA
bp_sceneid	Percent burn probability (scaled) and land cover conditions (unscaled)	INT16	Percent & Flag	-9998-1000	-9998-1000	-9999	NA	0.1 (0-1000 only)
Annual composites								
bc_YYYY	Number of per-scene images where burns were detected	INT16	Flag	0-366	0-366	-9999	NA	NA
bd_YYYY	Julian day of year of per-scene image where a burn was first classified	INT16	Flag	0-366	0-366	-9999	NA	NA
bp_YYYY	Maximum probability that a pixel was burned	INT16	Percent & Flag	0-100	0-1000	-9999	NA	0.1 (0-1000 only)
gc_YYYY	Number of days where is pixel was unobstructed	INT16	Flag	0-366	0-366	-9999	NA	NA

Table 2-B Burned Area Essential Climate Variable (BAECV) per-scene and annual composite burn probability bit values

Value	Interpretation
-9999	Fill
-6	Cloud
-5	Adjacent cloud
-4	Cloud shadow
-3	Snow/Ice
-2	Water
0-999	Burn probability (10.0 * %)

Table 2-C Burned Area Essential Climate Variable (BAECV) per-scene burn classification bit values

Bit	Interpretation
-9999	Fill
-6	Cloud
-5	Adjacent cloud
-4	Cloud shadow
-3	Snow/Ice
-2	Water
0	Unburned
1-32767	Burned area size (pixels)

Section 3 User Services

Landsat high-level products and associated interfaces are supported by User Services staff at USGS EROS. Any questions or comments regarding data products or interfaces are welcomed through the Landsat “Contact Us” online correspondence form: http://landsat.usgs.gov/contactus.php?topic=UCE. E-mail can also be sent to the customer service address included below, with the same indication of topic.

USGS User Services
http://landsat.usgs.gov/contactus.php
custserv@usgs.gov

User support is available Monday through Friday from 8:00 a.m. – 4:00 p.m. Central Time. Inquiries received outside of these hours will be addressed during the next business day.

Appendix A Default File Characteristics

Example of annual composite files. Actual file sizes may vary slightly by WRS2 path/rows.

Description	Example File Size (bytes)	Example File Name
Number of days where is pixel was unobstructed	109,297,562	gc_2008.tif
Number of days where is pixel was unobstructed – histogram file	878	gc_2008.tif.aux.xml
Maximum probability that a pixel was burned	109,297,562	bp_2008.tif
Maximum probability that a pixel was burned – histogram file	878	bp_2008.tif.aux.xml
Number of per-scene images where burns were detected	109,297,562	bc_2008.tif
Number of per-scene images where burns were detected – histogram file	878	bc_2008.tif.aux.xml
Julian day of year of per-scene image where a burn was first classified	109,297,562	bd_2008.tif
Julian day of year of per-scene image where a burn was first classified – histogram file	878	bd_2008.tif.aux.xml